THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An improved apparatus for identifying the existence of viable biological particles from a particle population containing a mixture of biologically viable and biologically inert particles, the improvement comprising:

a solid state excitation source wherein said source is a laser diode for emitting a light beam being directed to contact particles of the particle population and having a wavelength above about 320nm which is operative to excite biomolecules contained therein to produce fluorescence;

a photon counter for measuring the intensity of fluorescence emitted from each contacted particle and producing a signal indicative thereof; and

a microprocessor for comparing each contacted particle's fluorescent intensity signal against predetermined criteria and establishing whether that particle is a biologically viable particle or an inert particle.

2. The improved apparatus of claim 1 wherein the laser diode has a wavelength operative to excite biomolecules from the group consisting of NADH and flavinoids.

3. The improved apparatus of claim 2 wherein the laser diode has a wavelength in the range of about 320 nm to about 420 nm.

4. The improved apparatus of claim 3 wherein the laser diode has a wavelength operative to excite NADH.

5. The improved apparatus of claim 4 wherein the laser diode has a wavelength in the range of about 320 nm to about 360 nm.

6. The improved apparatus of claim 3 wherein the laser diode has a wavelength operative to excite flavinoids.

7. The improved apparatus of claim 6 wherein the laser diode has a wavelength in the range of about 360 nm to about 420 nm.

8. The improved apparatus of claim 6 further comprising:

means for measuring the size of the contacted particle as indicative of a biological characteristic; and

means for establishing the contacted particle as a candidate particle if its size is within the range of particles which are respirable.

9. The improved apparatus of claim 8 wherein the size measuring means comprises:

a sequencer for directing the particles individually and sequentially along a substantially linear path through air;

an instrument for determining the position of each particle in the airstream as a function of time and the particle's time of flight between two points along the linear path so as to establish the particle's size.

10. The improved apparatus of claim 1 wherein the laser diode light beam is emitted at a power of about 8 – 15mW.

11. The improved apparatus of claim 10 wherein the laser diode has a wavelength operative to excite biomolecules from the group consisting of NADH and flavinoids.

12. The improved apparatus of claim 10 wherein the laser diode has a wavelength in the range of about 320 nm to about 420 nm.

13. The improved apparatus of claim 12 wherein the laser diode has a wavelength operative to excite NADH.

14. The improved apparatus of claim 13 wherein the laser diode has a wavelength in the range of about 320 nm to about 360 nm.

15. The improved apparatus of claim 12 wherein the laser diode has a wavelength operative to excite flavinoids.

16. The improved apparatus of claim 15 wherein the laser diode has a wavelength in the range of about 360 nm to about 420 nm.

17.

An improved apparatus for identifying the existence of viable biological particles from a particle population containing a mixture of biologically viable and biologically inert particles, the improvement comprising:

a solid state excitation source wherein said source is a laser diode for emitting a light beam being directed to contact particles of the particle population and having a wavelength above about 320nm which is operative to excite biomolecules contained therein to produce fluorescence;

means for measuring the intensity of fluorescence emitted from each particle and producing a signal indicative thereof; and

means for comparing each particle's fluorescence intensity signal against pre-determined criteria and establishing whether that particle is biologically viable or an inert particle.

18. The improved apparatus of claim 17 wherein the intensity measuring means comprise a photon counter.

19. The improved apparatus of claim 17 wherein the intensity measuring means comprise a microprocessor.

20. A method for identifying the existence of viable biological particles from a particle population containing a mixture of biologically viable and biologically inert particles, the method comprising:

providing a solid state excitation source wherein said source is a laser diode for emitting a light beam having a wavelength from about 320nm to 500nm and a detector for measuring fluorescence emission and producing a signal indicative of the intensity thereof;

contacting the laser beam and particles of the population so as to excite biomolecules contained in a contacted particle to produce fluorescence;

using the detector to measure the intensity of fluorescence from the contacted particle;

comparing each particle's fluorescence intensity signal against pre-determined criteria and establishing whether that particle is biologically viable or an inert particle.

21. The method of claim 20 further comprising:

measuring the size of the contacted particle as a biological characteristic; and

establishing the contacted particle as a candidate particle if its size is within the range of particles which are respirable.

22. The method of claim 20 wherein the laser diode has a wavelength operative to excite biomolecules from the group consisting of NADH and flavinoids.

23. The method of claim 20 wherein the laser diode has a wavelength operative to excite NADH.

24. The method of claim 20 wherein the laser diode has a wavelength operative to excite riboflavin.